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REPORT ON THE SINKING OF THE TANKER "ARROW", CHEDABUCTO BAY, NOVA SCOTIA

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Edison Water Quality Laboratory
Edison, New Jersey

February 1970

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DIVISION OF WATER POLLUTION CONTROL

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AN ON-SCENE REPORT

THE SINKING OF THE TANKER "ARROW"

Chedabucto Bay, Nova Scotia

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FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

U. S. DEPARTMENT OF THE INTERIOR

INTRODUCTION

On Wednesday, February 4, 1970, the Greek tanker, Arrow, of Liberian registry, went aground on Cerberus Rock in Chedabucto Bay, Nova Scotia. She was bound for the docks of Canadian Pulp, Ltd., near Port Hawksbury, with a cargo of 16,000 tons of Bunker C Oil.

The subsequent events are still unclear in detail, but the major happenings are fairly apparent. As representative of the FWPCA on scene from February 10 through 13, I recorded the following impressions. The scene was one of great tension and confusion, with information coming from diverse sources of varying reliability. Thus, some of the following may not be accurate, but should be useful until official investigations and reports bring forth the exact events.

Although not of the magnitude of the Torrey Canyon, this incident involved severe pollution and is similar to what might be expected off the coast of Maine. A number of unfavorable circumstances combined to form an exceptionally difficult incident:

1. The vessel went aground in a bay almost completely surrounded by land, so the chances for dispersion of oil at sea by natural forces was very slight.

2. Air and water temperatures were near freezing.

3. The oil, at this temperature, was almost solid, could not be pumped, and tended not to disperse easily.

4. The area was remote, lacking readily available resources such as vacuum trucks.

5. The shores were generally inaccessible; beaches were shingle and boulder beaches, extremely difficult to clean.

The results can hardly be termed a success story; hence, many of the following comments are critical. However, they are not intended to reflect poorly on the Canadians who acted admirably under extremely difficult circumstances. Rather, they are intended to use the benefit of hind sight to discuss how we might learn from this unfortunate experience and improve our response capability.

CONCLUSIONS

1. Contingency planning is essential. The Canadians entered this incident without a contingency plan. Most of the people involved had little or no previous experience with oil pollution. As a result much time was lost organizing and considering various options which should have been thought out to some extent beforehand.

2. Timely and concerted action is vital. This requires action and decisions at two levels: political and operational. Fortuitous conditions often will not occur. The Canadian team was hampered by retention of such decisions as the disposition of the stern section, if freed, at the political level. The timing and magnitude of events coupled with the vagaries of weather require concerted action of a military nature. These events occur without notice and require immediate marshalling and coordination of people and material. Yet such a military-type operation is only as good as the objectives given it — the political decisions. Timely advice on options must be funnelled to the political decision-makers and the necessity of timely decisions emphasized.

3. The state-of-the-art of oil pollution control is such that any action involves considerable risk. Yet these risks must be assumed to prevent a serious and continuing pollution problem such as resulted with the Arrow. The Canadians preferred to keep their options open and await fortuitous combination of circumstances. These never arrived and the vessel was lost. This attitude penetrated the operational level with some loss of a sense of urgency. Things seemed to get underway about 10:00 am daily and, although several hundred government people were available, only a score or so were fully utilized.

4. Reliable salvage advice is essential. Effective salvage can remove the pollution problem and should receive highest priority. Salvage people must be informed of the pollution problems and vice-versa. Timely and effective salvage could have solved the Arrow problem. But decisions must be quick and action concerted. A major problem is the need for competent advice on salvage. This seems to be an arcane art, entrusted to the select few. But, as with war, salvage is too important to be left to the salvors. Guidelines and agreements must pre-exist for timely, concerted action.

5. The decision to do nothing, however rational, is difficult. Inaction is politically distasteful and people tend towards the visible. This appeared to have been the case partially with the attempt to burn oil along the shore. Although published information indicates that Bunker C has relatively mild effects on the intertidal life, the urge to do something was powerful.

6. Shore contamination was heavy, but damage was difficult to assess. Possibly 2,000 sea birds perished. A large number of recently dead sea urchins were observed, but this may not have been caused by oil. Plankton tows showed no damage. The shores were remarkably beautiful but not intensively used for recreation.

7. Operationally available control methods were inadequate.

   a. Dispersants were not favorably considered. Corexit 8666 apparently was the only chemical on hand, with a stockpile of several hundred barrels. It was ruled out because of toxicity, although it appears to be relatively non-toxic. Although it seems to be markedly more effective than Corexit 7664 on heavy oils, field trials gave unclear results.

   b. Burning of floating oil shows promise. Pittsburg-Corning "Sea Beads" showed an ability to burn Bunker C oil in cold weather, with 15 knot winds. Combustion was not complete, but reignition was possible. There seemed to be relatively little danger of an uncontrolled conflagration, since burning was limited to the area of application of "Sea Beads". Yet use was limited to small slicks and full-scale trials are needed. The one full-scale trial was prevented by the rapid spread of oil to a thin slick. Effective burning may require some sort of containment.

Feb. 9, 1970 - Monday

Arrived at Halifax/Dartmouth Airport about 9:30 pm. With no success in reaching Mr. Weston of the Department of Transport, my assigned contact, by phone I rented a car and began the drive to Port Hawksbury. Becoming weary I stopped at 11:30 pm at Antigonish. Half of the motel was occupied by CBC crews covering the incident.

Feb. 10, 1970 - Tuesday

Arose early and drove to the operation headquarters at the Port Hawksbury Motel. I immediately ran into Farrel Boyce of the Canadian Inland Waters Research Laboratory, Department of Minerals, Mines, and Natural Resources at Burlington, Ontario, who had attended one of our courses at Edison. Through him I met the apparent operations team: James Hornsby, DOT on-scene commander, Captain Marsham, DOT accident investigator and Hornsby's assistant for this incident, and Dr. A. G. Le Feuvre, Boyce's boss. These gentlemen were cooperating with Mr. Berrister and others from Imperial Oil.

A number of other unidentified people were milling around in a scene of general confusion. Formal assignments obviously had not been made and the "chiefs" were occupied with such tasks as answering the telephone. The status of the vessel was unclear, except that she still was aground. Similarly, not much seemed to be known of the extent of pollution.

The motel, and the town, was full of representatives of the press and some manufacturers, notably Pittsburg-Corning, who had apparently been invited by the Canadian government, and Esso Research and Engineering. (Imperial is a subsidiary of Standard Oil of New Jersey.) However, there was a mere trickle of "whiffle-dust" vendors compared to the deluge of other recent incidents. The remoteness and relatively non-sensational publicity seemed to have contributed to their absence.

The events to date appeared to be as follows:

Feb. 4, 1970 - Wednesday

The vessel went aground at about 13 knots speed on Cerberus Rock, a well-marked rock alongside a channel five miles wide. No reason was given for the grounding and no distress call was sent, merely a wire to the pilot that the vessel would be "a little late arriving".

Feb. 4-7, 1970 - Wednesday-Saturday

Salvage efforts were reportedly being directed by TOVALOP, but on the weekend after the Arrow broke up, the Canadian government apparently declared Imperial Oil responsible.

Feb. 9, 1970 - Monday

Sometime about this date the Esso people sprayed Corexit 8666 onto the slick from aircraft with unclear results. Also, the Pittsburg-Corning "Sea Beads" had been used, under Le Feuvre's supervision on small slicks on and just off shore near Arichat, with reported success. Reports of oiled beaches included several miles either side of Arichat and about eight miles along the south shore of Chedabucto Bay.

At the motel I also ran into Captain Alexander and Cmdr. McLean of the First Naval District, Boston.

The plans for the day were somewhat informal. I joined Le Feuvre who was shepherding another trial run with the Pittsburg-Corning "Sea Beads". This manufacturer had been selected, apparently as the result of demonstrations held at Edison during September 1969, as part of the training course on Oil and Hazardous Materials. Le Feuvre was interested in the possible use of burning agents on spills in the Arctic as well as on this incident.

After extensive delays we sailed from Arichat on the Shediac Bay, a long-liner converted for use as a patrol boat for the Department of Fisheries. We reached the Arrow at about 2:30 pm. She was broken in two with the two sections at right angles to each other, the bow just awash and the stern sticking up at an angle with rudder exposed. Two tugs had lines to the rear of the stern section and were maintaining tension.

Spreading southward from the Arrow were moderate slicks consisting mostly of an iridescent film, but with globs up to fifteen feet in diameter of viscous Bunker C. These globs held together in the calm seas and "buckled" with the waves. They appeared to be no more than 3/8 inch thick. Ninety-nine percent of the slick area was iridescent form.

One glob was selected and coated with "Sea Beads". This was followed by some Varsol and a marking flare (supplied by Canadian Navy personnel attached to operation: Cmdr. Hoult and Chief Petty Officer Eisler). The slick burst into flame and burned for about 90 seconds.

The second trial on another glob was more impressive. The patch of oil, 15 feet in diameter, burned vigorously for almost 5 minutes, belching great clouds of black smoke. Obviously, the Bunker C was burning. The flame slowly spread across the patch of oil, the flames being bent almost horizontally by the 15 knot wind. Gradually, a cooling front appeared to form on the windward edge of the patch which appeared to drive the flame slowly across the patch until it extinguished on the lee edge. The glob was readily reignited with Varsol and a flare and after three burnings, a patch of about 10 feet by 5 feet, containing somewhat less than half of the original oil remained. Although the oil was far from being consumed, the ability of "Sea Beads" to sustain combustion was very impressive.

Returning to Port Hawksbury that night I ran into Cmdr. Curry of the U. S. Coast Guard, Boston, and a team of U. S. Army flame thrower experts from Fort Devens, Mass., apparently requested by Capt. Alexander.

Today appeared to have been organization day for the Canadians who entered this incident without a contingency plan. A spokesman for environmental concerns had arrived. He was Mr. Leaziel of the Department of Fisheries. Several DOT and fisheries vessels were on scene and an oceanographic research vessel from the Bedford Institute was en route.

The plan, at this point, appeared to be to sit tight through tomorrow's predicted gales and on Thursday with winds to the west, which would blow the oil to sea, to attempt to free the stern. Apparently, some tanks in the forward part of the stern section were full of water and could be "blown" with relatively little additional pollution. A compressor had been helilifted today to the deck of the stern section for this purpose. The stern apparently was fairly intact, but fears were that she would "go vertical" if pulled off without the additional buoyancy forward.

Also, today, the Esso people had gone out alone and tried Corexit 8666 on some small slicks, by applying with back pumps, agitating with prop wash. Results were unclear because of "operational problems".

I talked for awhile with Dr. Richard Warner of the Univ. of Newfoundland who had been hired as a biological consultant by Imperial Oil. He seemed concerned about effects of the oil on the intertidal zone, and favored the use of "Sea Beads" to burn oil in the tidal pools along the south shore of Chedabucto Bay. I tried to point out that this would likely cause intertidal losses, whereas the Bunker C was known to be fairly innocuous, and that the amounts of oil destroyed would not significantly reduce the problem.

While along the south shore this afternoon on the Shediac Bay, we observed an extremely thin slick extending about 1 1/2 miles offshore and along shore as far as one could see. As the boat cut through the slick the oil parted, leaving a clear path the distance of visibility - about one mile.

Feb. 11, 1970 - Wednesday

As predicted, the winds and storm arrived. I had planned to observe field trials of Corexit 8666, but these were abandoned. Leaziel had expressed interest in data on this chemical so I called Dr. Tarzwell and Edison for mummichog bioassays and SET tests. I relayed these results through Boyce and Le Feuvre along with information from Edison on the absorptive properties of straw and tree bark. (A few truck loads of straw were arriving in town, apparently as a stockpile for possible use.)

I talked with Leziel, the environmental spokesman. He, too, was new to the problem of oil pollution and was taking a moderate course of no drastic action. He appeared to oppose the use of chemicals, but favored the burning of tidal pools. I pointed out that most data indicated that Bunker C had relatively mild biological effects, except for the birds.

This was a day of waiting and catching up on sleep. Rather than waste it, I surveyed the shore from Arichat to Marache Point. The pollution was remarkably severe. This was a barren area, relatively inaccessible with jagged rocks interspersed with shingle or boulder beaches. It is a striking and beautiful landscape, similar to the coast of Maine. Notes are as follows:

Feb. 11, 1970 - 1130 hrs., off lighthouse, Marache Point

Asphalt-like oil covers rocks and pebble beaches at high tide line, coverage from light (10% area) to heavy (50% area).

Some iridescence in sheltered areas, negligible percent of oil in this form, asphalt-like coat remains on rocks, does not float to surface - no repollution.

On one shingle beach 50 ft. long ~ 24 moribund appearing sea urchins, 1.5" diameter, oil on mouth.

Shore face between Marache Point and Forest Cove coverage ~ 20%, no oil on water; many sea urchin carcasses, of varying time after death;

one dead bird, completely oil covered, form like a teal; one heavily oiled diving bird (pointed bill, short, sharp wings) flapped off rocks into surf, disappeared 30 seconds later; pebble and boulder beaches, when steep, appear to clean themselves.

Oil globs on snow or ice caused melting, impressions several inches deep.

Just south of Cape Auget, heavy oil coverage on rocks and pebbles (~ 75% area), iridescent to blotched slick in fingers ~ 100 yards offshore.

Slight promitory, 1/8 mi. in Cape Auget, 80% oil cover, in some tide pools oil ~ 1/8" thick, local resident says he counted about 12 ducks oiled yesterday along about 300 yds. beach, also saw 6 oiled ducks in woods, 1/4 mi. from shore.

One gull, healthy-looking (immature black-backed) had 1/3 underparts stained with oil.

Little Barachois - one dead oiled flat-bill duck just to south, cove itself is clean.

Conservative estimate - dead and dying birds during last 48 hrs. from Marache Point → Arichat: 100-200.

Talking with several local residents I heard many complaints, primarily from soiling of clothes of children, and rugs and furniture by children and dogs. One man reportedly shot two dogs he couldn't get clean.

Significant observations:

1. A significant, but not disastrous bird kill.

2. Hundreds of dead sea urchins - normal for this time of year?

3. The oil stuck to the rocks as it hit, with little apparent tendency to refloat and repollute.

4. Oil in small amounts caused marked melting of ice and snow.

I ate dinner with the U. S. contingent and Capt. Marsham, DOT, deputy on-scene-commander. According to Marsham the attempt to dislodge the stern was awaiting a fortuitous combination of circumstances. No

decision had yet been made of what to do with the stern when freed. Apparently this, with other matters, was being retained as a political decision. The bow section was receiving secondary (i. e. negligible) consideration.. Some thought had been given to gelling its contents with Esso's gelling agent. However, this had been used only in thousand gallon tanks and the cost of $250,000 was considered too expensive.

Feb. 12, 1970 - Thursday

Having grown tired of the slow pace, I decided to return home. I packed my bags and dropped by the Port Hawksbury Motel to make my farewells. Cmdr. McLean and the U. S. Army flame thrower team were heading off for Arichat to carry out some burning trials, independent of Le Feuvre.

At the motel the atmosphere was one of tense anticipation. Rumors, whispers, urgent gatherings, and secrecy. The Pittsburg-Corning people were on immediate standby. Apparently, the plan was, as soon as the wind subsided and shifted to the west, to blow several tanks in the stern, believed to be full of oil and water, pull the stern free and tow to sea to be sunk. The oil from the purged tanks was to be burned with "sea beads". I decided to stay and made for the C.C.G.S. Skua. Here, I found Le Feuvre and the Pittsburg-Corning system to be readied. An Erosion Control, Inc. mulcher/blower had been fastened to the port bow and 120 bags (4 cu. ft. ea.) of "sea beads" were on board. Three hundred more bags were en route by chartered jet and the Kansas City plant was producing 24 hours per day.

The Skua was the sole radio link for headquarters — 4 miles from the motel (!!) and had to await replacement by the Dawson before making way. In the midst of this activity, at 10:35 am a laconic radio message crackled in from the Fountain Valley (apparently one of the tugs maintaining tension on the stern section): the stern section had sunk. This message was relayed to the motel from a phone booth on shore, creating a minor panic. Apparently, oil had been released, so after some confusion, the Skua set sail to burn the slick.

We steamed out into the heavy seas, with eight foot swells and 40 knot winds. Along the way were occasional "leathery" patches of tarry oil, from 6" to 3' in diameter.

At the scene of the wreck were no vessels — all had left. Only the foremast was visible and occasionally in the wave troughs the top of the smoke stack on the stern would appear.

Some oil was being discharged, but spreading rapidly. The slick widened quickly to about 400 yds. at most and had disappeared within a mile downwind. It consisted mostly of an iridescent sheen with occasional (every 100' or so) leathery blobs about 6' in diameter. These blobs were covered by a layer of water about 1/4" thick.

Confronted with this scene we turned and sailed back. Great confusion existed throughout this operation as to where the oil was and what exactly was a slick by visual sighting. Attempts to provide helicopter coverage failed since the Skua could communicate directly with neither the headquarters or the helicopters.

About 8 miles from the wreck to the west we passed through a slick consisting of iridescent sheen interspersed by small (1-2") globs of black oil in a peppery pattern, 3-4" apart. Large groups of these peppery arrangements swept past. Occasionally, we'd see a leathery glob 3" in diameter.

When we reached Port Hawksbury I departed for home, leaving a somewhat disheartened group of Canadians.

CONCUSIONS FROM DISCUSSION WITH LCDR. JAMES J. COLEMAN, USN, ATLANTIC FLEET SALVAGE OFFICER

The Arrow was generally intact for two days after grounding. The principle question at this time was whether or not she was impaled on Cerberus Rock. If she were, no amount of tugging would remove her. If she merely rested on the rock, she probably could have been pulled off. Thus, initial action should have been to bring in powerful tugs and these not budging her, "blow" several tanks to lighten her. This, of course, would have released some oil.

During this time the salvors boarded the Arrow and got up steam, but the Greek crewmen followed them around shutting everything down!!

If the vessel were impaled, getting her off would be a major, time-consuming task. The first action would have been to secure the vessel with "beach gear" — essentially lines and anchors to fix her in a four point mooring. This would have stabilized her and reduced the probability of later loss. "Beach gear" could likely be fixed in 24 hours with favorable weather. However, "beach gear" is not available in Canada, or with the salvor from Halifax involved in this incident. Such "beach gear" is available from the U. S. Navy and large private salvors such as Murphy-Pacific. The U. S. Navy offered such materials for use on the Arrow, through the Royal Canadian Navy, but the Canadian Navy was reluctant to get involved.

The vessel cracked on Saturday and broke in two on Sunday. Had it been lightened with some loss of oil, it may have been freed (at least the stern section) with the removal of the major portion of oil. Had it been fixed with "beach gear" the chances of losing the stern, as occurred on Thursday, would have been substantially reduced. Several calm days were available early in the second week for transfer of materials from the deck of smaller vessels to the Arrow.